

Optical magnetometer

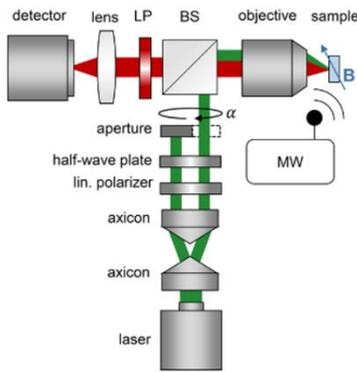
Vector magnetometry based on polarimetric optically detected magnetic resonance

Invention

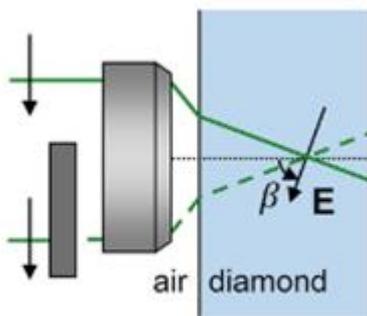
The Earth's magnetic field plays an important role in physics, geophysics, planetology, and archaeology in such areas as soil or material analysis. A magnetometer is generally used to measure the strength and direction of magnetic fields. Scientists at the University of Siegen have invented an optical vector magnetometer consisting of a green-light laser source, a microwave source, and a diamond sensor with NV (nitrogen-vacancy) centers.

The green laser light and microwaves radiate the diamond perpendicular to the [111] crystal orientation. An optical detector measures diamond sensor fluorescence intensity, a polarization filter determines fluorescent light polarization, and downstream analysis electronics then use the measured values to determine the magnetic field at the sensor.

The invention's big advantage is that the magnetic field can be determined optically and requires no external magnetic field for calibration.



Test set-up featuring diamond sample with NV centers.



The linearly polarized annular beam is partially blocked so that it is off-center.

Commercial Opportunities

The invention can measure magnetic fields at high sensitivity for such applications as soil and material analysis and navigation systems. The procedure is also easy to integrate into existing fluorescence microscopes with an upgrade kit for industrial semiconductor inspection, for instance.

Current Status

Initial laboratory samples have been created and the procedure's fundamental functionality documented. It has been registered with the German Patent and Trade Mark Office. It can be registered in other countries in the priority

year or upon later PCT registration. We are offering interested companies the opportunity to license and refine the technology in collaboration with the inventors and the University of Siegen.

Relevant Publications

A publication: <https://doi.org/10.1002/qute.202200077>

An invention of University of Siegen.

Competitive Advantages

- Optical magnetometer
- Less calibration effort
- Good integrability in fluorescence microscopes

Technology Readiness Level

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Experimental proof of concept

Industries

- Sensors
- Measurement technology

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